Embracing the perspectives of older adults in organising and evaluating person-centred and integrated care

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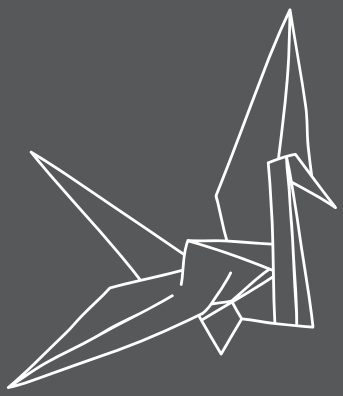

Health-related problems and their 1-year's changes as assessed with the Geriatric ICF Core Set (GeriatrICS) in community-living frail older adults receiving person-centred and integrated care from Embrace

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ABSTRACT

Purpose ♦ To assess the prevalence, severity and change in health-related problems as measured with the Geriatric ICF Core Set (GeriatrICS) in a sample of community-living older adults receiving individual care and support from 'Embrace', overall, per subgroup based on complexity of care needs and frailty, and for those who had a problem at baseline.

Methods ♦ A pretest-posttest study was conducted on older adults aged 75^{+} who were frail (n=56) or had complex care needs (n=80). Health-related problems as perceived by older adults were measured at baseline and after twelve months.

Results ♦ Health-related problems were related to six clusters: 'Mental Functions', 'Physical Health', 'Mobility', 'Personal Care', 'Nutrition' and 'Support'. After receiving person-centred and integrated care and support for twelve months, prevalence and severity of health-related problems decreased in all clusters, although the changes in Mobility were less clear. Frail participants with a problem had higher baseline severity scores than those with complex care needs experiencing a problem, but differences in changes between frail individuals and those with complex care needs were small.

Conclusions ♦ The GeriatrICS enabled professionals to inventory the prevalence and severity of health-related problems as reported by older adults, and to detect changes in these perceived problems.

BACKGROUND

Current healthcare systems are insufficiently well equipped to provide appropriate care and support to older adults with healthcare needs. Up to two-thirds of the population aged 75 and older suffers from multimorbidity.[1-4] These individuals present a wide variety of health-related problems,[5,6] with great variability in health and health-related functional ability.[7-9] However, the current healthcare systems focus on treating single diseases. This results in inefficient, ineffective and fragmented care for this growing older population.[10,11] Therefore, current healthcare systems have to deal with the complexity of treating multimorbidity and the changing and diverse healthcare needs of older adults, which calls for a system change.[10-13]

Person-centred and integrated care services could encourage comprehensive care for older adults,[11] as acknowledged by the European Union (EU),[14] the World Health Organization (WHO)[12,13] and older adults themselves.[15] According to the WHO, person-centred care is 'organised around the health needs and expectations of people rather than diseases'. Integrated care services provide a continuum of care and support and address the needs of the individual.[13] An example of such a new person-centred and integrated care service for older adults is 'Embrace'.[16] Embrace is based on the increasingly popular Chronic Care Model[17,18] combined with the Kaiser Permanente triangle,[19] a Population Health Management model. The aim of Embrace is to prolong ageing in place by addressing the needs of the individual older adult living in the community.

Insight into the health-related problems and accompanying needs of the older adult could guide the delivery of person-centred and integrated care and support. The Geriatric ICF Core Set (GeriatrICS) has been developed to provide such insight through history taking. It reflects the most relevant health-related problems of community-living older adults without a dementia diagnosis and is based on the International Classification of Functioning, Disability and Health (ICF).[20]

The first objective of this study was to assess the prevalence and severity of health-related problems and the change after receiving individual care and support from 'Embrace' for the whole sample and for subgroups based on complexity of care needs and level of frailty. The second objective was to assess the above for those who had a problem at baseline.

METHODS

Study design

We conducted a twelve-month single-group pretest-posttest study on a group of older adults aged 75 and older who were allocated to the intervention group of a randomized controlled trial on the effectiveness of the person-centred and integrated care service 'Embrace'.[16] The Medical Ethical Committee of the University Medical Center Groningen assessed the Embrace study proposal and concluded that approval was not required (Reference METc2011.108). All participants provided written informed consent prior to the start of the Embrace study.

Sample

This pretest-posttest study examined a selected subsample of participants from the Embrace study: those with 'complex care needs' and those considered 'frail'. Embrace included people aged 75 and older who were registered with one of the participating general practitioners (GPs) (n=1456, response rate 48.7%). Participants were stratified into three risk profiles using complexity of care needs as measured with the INTERMED for the Elderly Self-Assessment (INTERMED-E-SA)[21] and the level of frailty as measured with the Groningen Frailty Indicator (GFI).[22,23] The resulting risk profiles are: 'Complex care needs' for participants with complex care needs at risk for assignment to a hospital or nursing home (INTERMED-E-SA ≥16), 'Frail' for participants at risk of complex care needs (INTERMED-E-SA <16 and a GFI ≥5) and 'Robust' for participants at risk for the consequences of ageing only (INTERMED-E-SA <16 and GFI <5). Participants were then randomized into the control or intervention groups. A more detailed description of the inclusion and exclusion criteria and classification of participants in the Embrace study has been published elsewhere.[16]

Those identified as frail or having complex care needs, who had been assigned to the intervention group of the Embrace study and who had completed baseline history-taking with the GeriatrICS[20] within six months of the start of the Embrace study were eligible for the current study (n=267). Actual inclusion comprised those who completed follow-up measurements twelve months after baseline assessment.

No statistically significant differences in the baseline characteristics and severity scores of ICF items were found between those included and those lost to follow-up. However, dropouts scored significantly worse than participants on 'experienced health today' (as measured using the EQ visual analogue scale; p=0.013), whereas participants scored worse on *b152 Emotional functions* (p=0.024) and *b710 Mobility* (p=0.035).

Embrace

Embrace (in Dutch: *SamenOud* [ageing together]) is a person-centred and integrated care service for community-living older adults. A multidisciplinary Elderly Care Team consisting of a GP, a nursing home physician[24] and two case managers – a district nurse and a social worker for the participants with complex care needs and frail participants, respectively – provided care and support to older adults. The intensity, focus and individual or group approach of care and support depended on the participant's risk profile. Frail people and those with complex care needs received individual support from a case manager. The participant and case manager jointly developed an individual care and support plan which targeted all health-related problems identified during history taking using the GeriatrICS.[20] Case managers monitored changes and navigated the plan's delivery. Participants were also invited to follow a self-management support and prevention programme – including regular Embrace community meetings – which focused on staying healthy and independent for as long as possible. Details of the implementation of Embrace have been published in the study protocol.[16]

Data collection and procedure

Data were collected at baseline (T0) and after twelve months (T1). Baseline measurements were performed during home visits between January and June 2012. During these visits, case managers took a history using the GeriatrICS,[20] which was integrated into the web-based electronic record system of Embrace. Baseline measurements using self-report questionnaires from the Embrace study (October-December 2011) provided data for assignment to the risk profiles at start, as well as data on background characteristics. Follow-up measurements were performed after approximately twelve months, either by the relevant case manager or by the participant completing a mailed, paper version of the GeriatrICS him or herself once individual care and support had ended.

Outcome measurements

Health-related problems were evaluated using the GeriatrICS, an ICF Core Set which includes 29 items covering fourteen Body Functions, nine Activities and Participation, and six Environmental Factor categories, all from the second ICF level.[20] During the assessment, participants had to indicate whether they experienced problems in functioning and whether they experienced lack of support in relation to the Environmental Factors items. Participants had to rate all the items on a visual analogue scale ranging from 0 (no problem) to 10 (very severe problem). In the paper version of the GeriatrICS, each ICF item from the GeriatrICS was translated into a single question.

Analysis

We first examined baseline data and changes per ICF item for the whole sample and for the subgroups 'Complex care needs' and 'Frail' (Objective 1). We analysed responses in terms of whether or not a health-related problem existed (prevalence) and in terms of its severity. Prevalence scores were dichotomized scores including 'no problem' (score 0) versus 'problem' (scores 1-10), while severity scores employed the full 0-10 range. Differences in prevalence between the subgroups ('Complex care needs' and 'Frail') at baseline were tested using difference of proportions tests and Mann-Whitney U tests to assess differences in severity. Changes in prevalence after twelve months were analysed using McNemar's tests. Changes in severity were analysed by Wilcoxon signed rank tests. We considered changes to be statistically significant at $p<0.05$ (two-tailed). We calculated Cohen's d effect sizes to determine the clinical relevance of the results.

We then repeated all the analyses for those who reported a problem at baseline (Objective 2), except for the change in prevalence, which we obviously could not test as the baseline numbers were the starting point for these analyses. We analysed using SPSS Statistics version 22.0 and calculated effect sizes using Microsoft Excel 2010.

RESULTS

The flow of participants is presented in Figure 1. Of the 267 eligible participants, 136 (50.9%) were included in this pretest-posttest study because they completed twelve months follow-up measurements. The participants' descriptive background characteristics are presented in Table 1. Participants with complex care needs scored worse on most background health characteristics than frail participants.

In general, the health-related problems reported by older adults could be grouped into six clusters: 'Mental Functions', 'Physical Health', 'Mobility', 'Personal Care', 'Nutrition' and 'Support' (see Table 2).

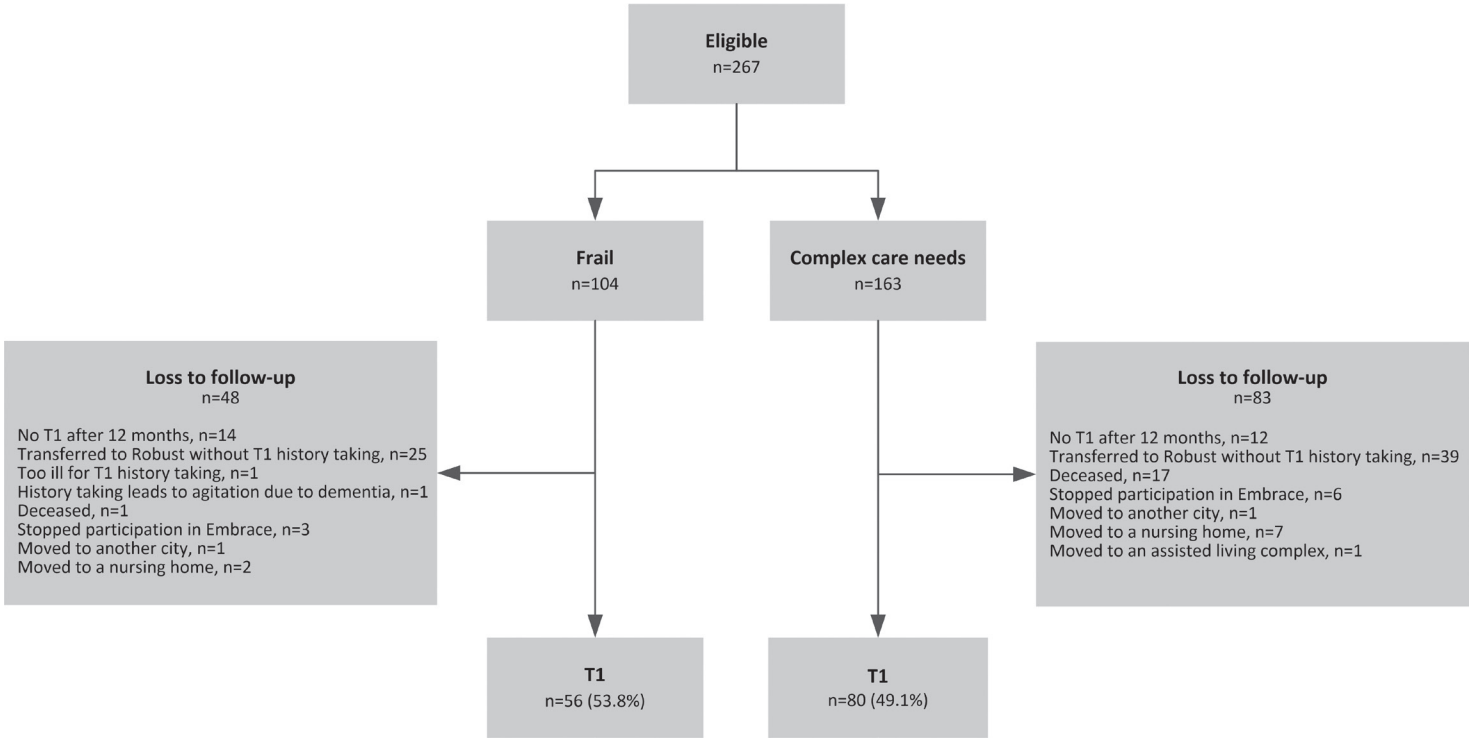

FIGURE 1 • Flowchart of participants

TABLE 1 ♦ Background characteristics of participants (n (%), unless stated otherwise)

	Total (n=136)		**Complex care needs** (n=80)		**Frail** (n=56)		p
Age at T0 in years, median (IQR)	80.5	(78.1-84.8)	81.4	(78.9-85.4)	79.7	(77.2-82.8)	**0.013**
Female	94	(69.1)	54	(67.5)	40	(71.4)	0.707
Married/unmarried living together	65	(47.8)	42	(52.5)	23	(41.1)	0.224
Community-living	133	(97.8)	77	(96.3)	56	(100.0)	0.268
Low education level[1]	81	(59.6)	48	(60.0)	33	(58.9)	1.000
Low income[2]	61	(54.0)	34	(51.5)	27	(57.4)	0.570
No. of chronic conditions, mean (SD)	3.4	(1.7)	3.6	(1.6)	3.1	(1.8)	0.099
Multiple chronic conditions	58	(42.6)	43	(53.8)	15	(26.8)	**0.003**
Use of ≥4 different medications	105	(77.2)	66	(82.5)	39	(69.6)	0.098
INTERMED-E-SA, median (IQR)	16.0	(12.0-20.0)	19.0	(17.0-21.8)	12.0	(10.3-14.0)	**<0.001**
GFI, median (IQR)	6.0	(5.0-8.0)	7.0	(5.0-8.0)	6.0	(5.0-7.0)	0.244
Health status (EQ-5D-3L), median (IQR)	0.69	(0.65-0.78)	0.69	(0.65-0.78)	0.73	(0.65-0.81)	**0.028**
Health status (EQ-VAS), median (IQR)	65.0	(50.0-70.0)	60.0	(50.0-70.0)	70.0	(65.0-80.0)	**<0.001**
QOL report mark, mean (SD)	6.7	(1.2)	6.4	(1.2)	7.2	(0.9)	**<0.001**
ADL (modified Katz ADL), median (IQR)	2.0	(1.0-4.0)	3.0	(1.3-5.0)	1.0	(0.0-3.0)	**<0.001**

ADL = Activities of daily living; EQ-5D-3L = EuroQol-5D-3L; EQ-VAS = EuroQol visual analogue scale;
GFI = Groningen Frailty Indicator; INTERMED-E-SA = INTERMED for the Elderly Self-Assessment;
IQR = Interquartile range; QOL= Quality of life.
[1] Low: (Less than) primary school or low vocational training.
[2] Low: <€1350 per month.
Differences between risk profiles were tested using independent t-tests for continuous variables, Chi-square tests for categorical variables, and Mann-Whitney U tests for non-normally distributed continuous variables and ordinal variables.

All older adults

Table 3 provides an overview of the prevalence of the problems reported at baseline, the severity and change in their prevalence, and the severity in the whole sample. The most prevalent and most severe problems at baseline were related to Mental Functions (*b152 Emotional functions*) and Mobility.

The changes in prevalence after twelve months varied. The largest decreases were found for items related to Mental Functions (*b152 Emotional functions*), Nutrition (*d560 Drinking*) and Support, whereas the prevalence of the Mobility-related items increased. Severity scores showed an overall decrease after twelve months, except for items related to Personal Care.

TABLE 2 • Items of the GeriatrICS grouped into clusters of health-related problems as experienced by community-living frail older adults

Cluster	GeriatrICS item (ICF category)
Mental Functions	b144 Memory functions
	b152 Emotional functions
Physical Health	b210 Seeing functions
	b230 Hearing functions
	b410 Heart functions
	b420 Blood pressure functions
	b525 Defecation functions
	b620 Urination functions
	b810 Protective functions of the skin
Mobility	b240 Sensations associated with hearing and vestibular function
	b455 Exercise tolerance functions
	b710 Mobility of joint functions
	b730 Muscle power functions
	d410 Changing basic body position
	d450 Walking
	d470 Using transportation
Personal Care	d510 Washing oneself
	d520 Caring for body parts
	d540 Dressing
Nutrition	b530 Weight maintenance functions
	d550 Eating
	d560 Drinking
Support	d760 Family relationships
	e310 Immediate family
	e320 Friends
	e325 Acquaintances, peers colleagues, neighbours and community members
	e570 Social security services, systems and policies
	e575 General social support services, systems and policies
	e580 Health services, systems and policies

ICF = International Classification of Functioning, Disability and Health.

TABLE 3 ♦ Baseline scores and change in prevalence and severity of health-related problems as assessed with the GeriatrICS

	Prevalence											
	Whole sample (n=136)				Complex care needs (n=80)				Frail (n=56)			
	T0 (%)	Δ (%)	p	ES	T0 (%)	Δ (%)	p	ES	T0 (%)	Δ (%)	p	ES
Mental Functions												
b144 Memory functions	41.2	1.5	0.877	0.05	35.0	8.8	0.248	0.29	50.0	-8.9	0.302	0.38
b152 Emotional functions	73.1	**-11.2**	**0.025**	0.45	75.0	-11.3	0.124	0.38	70.4	-11.1	0.146	0.61
Physical Health												
b210 Seeing functions	48.5	8.2	0.136	0.28	47.5	7.5	0.377	0.21	50.0	9.3	0.267	0.45
b230 Hearing functions	50.0	3.7	0.522	0.14	43.8	3.8	0.690	0.13	59.3	3.7	0.791	0.16
b410 Heart functions	51.5	-5.2	0.310	0.22	55.0	0.0	1.000	0.00	46.3	-13.0	0.065	0.83
b420 Blood pressure functions	44.8	0.0	1.000	0.00	51.3*	0.0	1.000	0.00	35.2	0.0	1.000	0.00
b525 Defecation functions	36.6	-3.0	0.626	0.12	40.0	2.5	0.850	0.08	31.5	3.7	0.754	0.22
b620 Urination functions	50.4	-4.5	0.451	0.15	56.3	5.0	0.584	0.15	41.5	3.8	0.791	0.16
b810 Protective functions of the skin	47.4	-6.7	0.200	0.26	43.0	2.5	0.832	0.10	53.6	-12.5	0.143	0.48
Mobility												
b240 Sensations associated with hearing and vestibular function	64.2	-6.0	0.302	0.19	70.0	1.3	1.000	0.04	55.6	-13.0	0.167	0.43
b455 Exercise tolerance functions	64.2	5.2	0.337	0.20	65.0	10.0	0.152	0.38	63.0	1.9	1.000	0.07
b710 Mobility of joint functions	74.4	0.0	1.000	0.00	67.5	5.0	0.541	0.19	84.9	-7.5	0.424	0.32
b730 Muscle power functions	47.4	**11.3**	**0.037**	0.38	51.3	12.5	0.100	0.38	41.5	9.4	0.302	0.38
d410 Changing basic body position	56.3	0.7	1.000	0.03	58.2	1.3	1.000	0.05	53.6	0.0	1.000	0.00
d450 Walking	62.7	3.7	0.542	0.13	63.3	3.8	0.664	0.16	61.8	3.6	0.832	0.10
d470 Using transportation	14.7	6.6	0.188	0.27	13.8	8.8	0.210	0.35	16.1	3.6	0.791	0.16
Personal Care												
d510 Washing oneself	19.9	-0.7	1.000	0.03	26.3*	1.3	1.000	0.04	10.7	0.0	1.000	0.00
d520 Caring for body parts	16.2	2.2	0.735	0.09	22.5*	1.3	1.000	0.04	7.1	7.1	0.344	0.47
d540 Dressing	15.4	7.4	0.123	0.33	20.0	11.3	0.124	0.38	8.9	1.8	1.000	0.16
Nutrition												
b530 Weight maintenance functions	30.8	-0.8	1.000	0.02	27.5	0.0	1.000	0.00	35.8	1.9	1.000	0.07
d550 Eating	11.8	-0.7	1.000	0.06	16.3	1.3	1.000	0.07	5.4	0.0	1.000	0.00
d560 Drinking	22.1	**-10.3**	**0.018**	0.56	27.5	-11.3	0.078	0.51	14.3	-8.9	0.180	0.69
Support												
d760 Family relationships	22.1	0.0	1.000	0.00	18.8	3.8	0.664	0.16	26.8	-5.4	0.581	0.26
e310 Immediate family	16.2	2.2	0.728	0.10	17.5	6.3	0.405	0.24	14.3	3.6	0.754	0.22
e320 Friends	27.2	-2.9	0.635	0.11	27.5	3.8	0.710	0.11	26.8	-12.5	0.065	0.83
e325 Acquaint., peers, colleagues, neighbours and community members	27.2	-3.7	0.472	0.18	31.3	0.0	1.000	0.00	21.4	-8.9	0.227	0.54
e570 Social security services, systems and policies	15.4	-5.9	0.096	0.53	16.3	-8.8	0.118	0.56	14.3	1.8	1.000	0.38
e575 General social support services, systems and policies	15.4	**-8.8**	**0.031**	0.55	16.3	-7.5	0.210	0.44	14.3	-10.7	0.109	0.77
e580 Health services, systems and policies	21.3	-6.6	0.176	0.29	16.3	0.0	1.000	0.00	28.6	-16.1	0.035	0.77

ES = Effect size d, thresholds <0.2 trivial, ≥0.2- 0.5 small, ≥0.5-0.8 medium, ≥0.8 large; T0 = baseline measurement; Δ = change between baseline and follow-up measurements.
* Significant difference (p<0.05) at baseline between participants with complex care needs and frail participants.
Missing values ranged between 1 and 3 per item.

after twelve months of person-centred and integrated care: results of the whole sample and per risk profile

	Severity										
	Whole sample (n=136)				Complex care needs (n=80)				Frail (n=56)			
T0	Δ	p	ES	T0	Δ	p	ES	T0	Δ	p	ES
1.4	**-0.3**	**0.042**	0.25	1.1	0.0	0.743	0.05	1.9*	**-0.7**	**0.011**	0.49
3.1	**-0.8**	**<0.001**	0.44	3.3	**-0.8**	**0.005**	0.45	2.8	**-0.8**	**0.024**	0.44
1.9	0.2	0.318	0.12	1.8	0.0	0.972	0.01	2.1	0.5	0.101	0.32
1.9	-0.1	0.773	0.04	1.5	-0.1	0.762	0.05	2.4*	0.0	0.836	0.04
1.7	-0.3	0.186	0.16	1.7	-0.1	0.632	0.08	1.7	-0.5	0.095	0.33
1.2	0.1	0.951	0.01	1.4	0.2	0.843	0.03	1.0	0.0	0.920	0.02
1.4	-0.3	0.189	0.16	1.4	-0.2	0.733	0.05	1.4	-0.5	0.073	0.35
1.9	-0.4	0.105	0.20	2.1	-0.5	0.155	0.23	1.6	-0.3	0.453	0.15
1.7	**-0.6**	**0.007**	0.33	1.6	-0.5	0.134	0.24	2.0	**-0.7**	**0.008**	0.52
2.6	**-0.7**	**0.008**	0.33	3.0*	**-0.8**	**0.039**	0.33	2.0	-0.6	0.088	0.33
2.4	0.1	0.774	0.04	2.2	0.5	0.148	0.23	2.6	-0.4	0.143	0.28
3.5	**-0.6**	**0.004**	0.36	3.2	-0.4	0.099	0.26	3.9	**-0.9**	**0.011**	0.51
1.5	0.4	0.164	0.17	1.3	0.5	0.117	0.25	1.8	0.1	0.743	0.06
2.1	-0.2	0.344	0.12	2.2	-0.5	0.196	0.21	2.0	0.1	0.854	0.03
2.6	-0.1	0.564	0.07	2.6	-0.2	0.600	0.08	2.7	0.0	0.821	0.04
0.5	0.1	0.284	0.13	0.4	0.2	0.182	0.21	0.8	0.0	0.932	0.02
0.6	0.0	0.979	0.00	0.7*	0.1	0.879	0.02	0.4	-0.1	0.725	0.07
0.3	0.1	0.545	0.07	0.4*	0.2	0.333	0.15	0.3	-0.1	0.787	0.05
0.4	0.1	0.159	0.17	0.4	0.2	0.127	0.24	0.3	0.0	1.000	0.00
1.0	-0.2	0.355	0.11	0.9	-0.3	0.452	0.12	1.1	-0.2	0.548	0.12
0.3	-0.1	0.283	0.13	0.5*	-0.2	0.262	0.18	0.1	0.0	1.000	0.00
0.8	**-0.5**	**0.002**	0.38	0.9	**-0.5**	**0.021**	0.37	0.6	**-0.5**	**0.035**	0.41
0.8	-0.2	0.317	0.12	0.6	0.0	0.946	0.01	1.0	-0.4	0.119	0.30
0.5	0.0	0.573	0.07	0.5	0.1	0.928	0.01	0.4	-0.2	0.412	0.16
0.8	**-0.4**	**0.029**	0.27	0.7	-0.2	0.394	0.14	1.0	**-0.6**	**0.015**	0.47
0.9	-0.3	0.099	0.20	0.8	-0.2	0.395	0.13	1.1	-0.5	0.106	0.31
0.5	-0.2	0.268	0.13	0.4	-0.2	0.154	0.23	0.7	-0.1	0.610	0.10
0.6	**-0.5**	**0.005**	0.35	0.6	**-0.4**	**0.035**	0.34	0.7	-0.5	0.074	0.34
0.8	-0.3	0.055	0.23	0.6	-0.2	0.513	0.10	1.0	**-0.5**	**0.016**	0.47

TABLE 3 • Legend

Very light grey filling	High prevalence ≥60.0% / high severity score at T0 ≥2.0
Light grey filling and black, bold text	Significant and clinically relevant increase in prevalence / severity
Light grey filling and black text	Non-significant, but clinically relevant increase in prevalence / severity
Dark grey filling and white, bold text	Significant and clinically relevant decrease in prevalence / severity
Dark grey filling and white text	Non-significant, but clinically relevant decrease in prevalence / severity

TABLE 4 • Baseline and change in prevalence and severity of health-related problems as assessed with the GeriatrICS for the whole sample and per risk profile

	Number of participants with a problem at baseline					
	Whole sample		Complex care needs		Frail	
	T0 (n)	Δ (%)	T0 (n)	Δ (%)	T0 (n)	Δ (%)
Mental Functions						
b144 Memory functions	56	-35.7	28	-35.7	28	-35.7
b152 Emotional functions	98	-27.6	60	-30.0	38	-23.7
Physical Health						
b210 Seeing functions	65	-26.2	38	-34.2	27	-14.8
b230 Hearing functions	67	-26.9	35	-31.4	32	-18.8
b410 Heart functions	69	-30.4	44	-27.3	25	-36.0
b420 Blood pressure functions	60	-38.3	41*	-36.6	19	-42.1
b525 Defecation functions	49	-42.9	32	-46.9	17	-35.3
b620 Urination functions	67	-35.8	45	-37.8	22	-36.4
b810 Protective functions of the skin	64	-37.5	34	-35.3	30	-40.0
Mobility						
b240 Sensations associated with hearing and vestibular function	86	-31.4	56	-25.0	30	-43.3
b455 Exercise tolerance functions	86	-18.6	52	-15.4	34	-23.5
b710 Mobility of joint functions	99	-21.2	54	-18.5	45	-20.0
b730 Muscle power functions	63	-25.4	41	-24.4	22	-22.7
d410 Changing basic body position	76	-23.7	46	-23.9	30	-23.3
d450 Walking	84	-21.4	50	-18.0	34	-29.4
d470 Using transportation	20	-70.0	11	-72.7	9	-66.7
Personal Care						
d510 Washing oneself	27	-66.7	21*	-66.7	6	-66.7
d520 Caring for body parts	22	-72.7	18*	-72.2	4	-75.0
d540 Dressing	21	-57.1	16	-56.3	5	-60.0
Nutrition						
b530 Weight maintenance functions	41	-61.0	22	-72.7	19	-42.1
d550 Eating	16	-62.5	13	-69.2	3	-33.3
d560 Drinking	30	-70.0	22	-68.2	8	-87.5
Support						
d760 Family relationships	30	-60.0	15	-60.0	15	-53.3
e310 Immediate family	22	-72.7	14	-64.3	8	-75.0
e320 Friends	37	-59.5	22	-59.1	15	-60.0
e325 Acquaint., peers, colleagues, neighbours and community members	37	-45.9	25	-40.0	12	-66.7
e570 Social security services, systems and policies	21	-61.9	13	-84.6	8	-25.0
e575 General social support services, systems and policies	21	-90.5	13	-84.6	8	-100.0
e580 Health services, systems and policies	29	-75.9	13	-76.9	16	-75.0

ES = Effect size d, thresholds <0.2 trivial, ≥0.2- 0.5 small, ≥0.5-0.8 medium, ≥0.8 large; T0 = baseline measurement;
Δ = change between baseline and follow-up measurements.
* Significant difference (p<0.05) between participants with complex care needs and frail participants.
Missing values ranged between 1 and 2 per item.

after twelve months of person-centred and integrated care: results of participants with a problem at baseline,

Severity											
Whole sample				Complex care needs				Frail			
T0	Δ	p	ES	T0	Δ	p	ES	T0	Δ	p	ES
3.4	-1.4	**<0.001**	0.77	3.1	-1.2	**0.001**	0.96	3.8	-1.7	**0.001**	0.98
4.2	-1.4	**<0.001**	0.57	4.3	-1.5	**<0.001**	0.85	4.0	-1.3	**0.004**	0.70
3.9	-0.7	**0.047**	0.35	3.8	-1.2	**0.011**	0.61	4.1	0.1	0.919	0.03
3.7	-0.9	**0.018**	0.42	3.5	-1.1	**0.040**	0.51	4.0	-0.5	0.202	0.32
3.4	-1.2	**<0.001**	0.69	3.2	-1.1	**0.002**	0.68	3.7	-1.4	**0.016**	0.72
2.7	-0.9	**0.002**	0.58	2.6	-0.8	**0.026**	0.51	2.8	-1.2	**0.035**	0.73
3.8	-1.8	**<0.001**	0.82	3.4	-1.5	**0.003**	0.80	4.6	-2.1	**0.015**	0.91
3.8	-1.6	**<0.001**	0.76	3.8	-1.6	**<0.001**	0.80	3.8	-1.6	**0.038**	0.66
3.7	-1.9	**<0.001**	0.93	3.7	-1.9	**0.004**	0.75	3.7	-1.9	**<0.001**	1.26
4.1	-1.7	**<0.001**	0.76	4.3	-1.7	**<0.001**	0.70	3.6	-1.7	**0.001**	0.92
3.7	-0.6	**0.024**	0.35	3.4	-0.1	0.579	0.11	4.2	-1.3	**0.003**	0.78
4.7	-1.3	**<0.001**	0.75	4.7	-1.4	**<0.001**	0.79	2.4	-1.2	**0.002**	0.70
3.2	-0.9	**0.003**	0.54	2.6	-0.7	**0.049**	0.45	4.4*	-1.3	**0.028**	0.70
3.7	-1.2	**0.001**	0.56	3.7	-1.5	**0.003**	0.65	3.8	-0.7	0.148	0.38
4.2	-1.2	**0.001**	0.53	4.0	-1.0	**0.033**	0.44	4.4	-1.3	**0.007**	0.69
3.6	-2.4	**0.001**	1.17	2.7	-1.9	**0.025**	1.09	4.7	-2.8	**0.017**	1.36
2.9	-1.5	**0.029**	0.62	2.5	-1.2	0.131	0.48	4.2	-2.5	0.068	1.24
2.0	-1.4	**0.003**	1.02	1.6	-0.8	**0.013**	0.91	4.3*	-3.8	0.066	1.71
2.3	-1.4	**0.001**	1.26	2.1	-1.4	**0.002**	1.30	3.0	-1.2	0.109	1.18
3.1	-2.0	**<0.001**	1.07	3.2	-2.6	**<0.001**	1.48	3.1	-1.3	**0.044**	0.69
2.6	-2.0	**0.001**	1.45	2.9	-2.3	**0.001**	1.62	1.3	-0.7	0.317	0.89
3.6	-3.0	**<0.001**	1.45	3.4	-2.6	**<0.001**	1.40	4.1	-3.9	**0.012**	1.63
3.4	-2.4	**<0.001**	1.43	3.0	-2.4	**0.001**	1.45	3.8	-2.3	**0.001**	1.45
2.8	-1.9	**<0.001**	1.37	2.9	-1.9	**0.002**	1.43	2.8	-2.4	**0.027**	1.32
3.0	-2.3	**<0.001**	1.31	2.5	-2.0	**<0.001**	1.38	3.7	-2.5	**0.004**	1.26
3.4	-2.1	**<0.001**	0.89	2.7	-1.2	**0.031**	0.64	5.0*	-3.8	**0.005**	1.41
3.5	-1.6	**0.048**	0.64	2.7	-1.5	**0.026**	0.97	4.9*	-1.4	0.344	0.49
4.0	-3.7	**<0.001**	1.47	3.5	-3.1	**0.003**	1.41	4.6	-4.6	**0.012**	1.63
3.7	-2.6	**<0.001**	1.15	3.8	-3.2	**0.008**	1.21	3.6	-2.1	**0.005**	1.13

TABLE 4 • Legend

Very light grey filling	High severity score at T0 ≥4.0
Grey filling and white text	Decrease in prevalence -50% to -70% / significant and clinically relevant decrease in severity <2.0
Dark grey filling and white text	Decrease in prevalence ≥-70% / significant and clinically relevant decrease in severity ≥2.0

Complex care needs' vs 'Frail' individuals

Baseline differences between subgroups were noticeable, as participants with complex care needs had higher prevalence and severity scores compared to frail participants, particularly regarding Personal Care (Table 3). Frail participants, on the other hand, had higher baseline severity scores on Mental Functions (*b144 Memory functions*) and Physical Health (*b230 Hearing functions*).

Participants with complex care needs had varying alterations after twelve months, both in the prevalence and severity of GeriatrICS items. Most remarkable was the varying pattern in Mobility and the decrease in the prevalence and severity of items related to Mental Functions (*b152 Emotional Functions*), Nutrition (*d560 Drinking*) and Support. Frail participants showed mainly decreases in prevalence and severity after twelve months, except for items related to Personal Care.

Older adults with problems at baseline

Table 4 shows the number of older adults experiencing a problem at baseline, their baseline severity scores and the changes in number of participants who still had a problem at follow-up, as well as the related severity scores. The baseline severity scores of those with a problem at baseline were highest for Mental Functions and Mobility.

Participants with a problem at baseline generally showed clear positive changes after twelve months. The largest reductions in the number of participants with persistent problems were in items related to Personal Care, Nutrition and Support. Severity scores decreased for all items, with the largest decreases being mostly related to Nutrition and Support.

'Complex care needs' vs 'Frail' individuals

Comparing the subgroups of participants with a problem at baseline showed similar, positively changing patterns in prevalence and severity, but baseline severity scores were higher for frail participants than for those with complex care needs (Table 4).

No differences were found between the subgroups in changes in the numbers of participants who still had a problem at follow-up, with decreases being largest in items related to Personal Care, Nutrition and Support. Severity scores decreased after twelve months, with decreases being largest in items related to Nutrition and Support.

DISCUSSION

This is the first study which used the GeriatrICS to obtain detailed insight into the prevalence, severity and changes in perceived health-related problems of community-living older adults who received twelve months of person-centred and integrated care and support. We could group health-related problems reported by older adults into six clusters: 'Mental Functions', 'Physical Health', 'Mobility', 'Personal Care', 'Nutrition' and 'Support'. The prevalence and severity of these problems decreased in all clusters after having received person-centred and integrated care for twelve months, except for Mobility which showed a more varying pattern. Furthermore, of those reporting a problem at baseline, frail participants reported higher severity scores than participants with complex care needs.

We found that the health-related problems of older adults could be grouped into six clusters comparable to the components of current geriatric assessment tools, such as Comprehensive Geriatric Assessments (CGA),[25] the Geriatric Minimum Dataset (GMDS-25),[26] EASY-Care,[27] the COPE assessment[28] and the WHO-DAS 2.0.[29] This thus confirms the appropriateness of these consensus-based diagnostic instruments for assessing the most common health-related problems in older adults from the perspective of the participants themselves. Moreover, this finding supports the relevance and validity of the GeriatrICS regarding the perspective of older adults.

Mobility-related problems were the most frequent and severe problems and showed a varying change pattern, with some items showing a decrease in severity and prevalence after twelve months, and others presenting an increase. This was especially the case for older adults with complex care needs. Mobility is known to constitute an important condition for independent living which often deteriorates during ageing. It is also a strong indicator of functional decline, health status and frailty.[30,31] Older adults were perhaps not sufficiently exposed to lifestyle interventions, such as physical exercise training or dietary adaptations, or encouraged to participate during the twelve months. Such lifestyle interventions could prevent or solve mobility problems.[30,32] Therefore, case managers and other health care and welfare professionals should pay extra attention to the possible preventive effect of such interventions for older adults.

Frail participants with a problem had higher baseline severity scores than participants with complex care needs experiencing a problem. However, both groups showed positively changing patterns after twelve months of person-centred and integrated care and support. The fact that frail participants had higher baseline severity scores is counterintuitive, as

those with complex care needs usually have a poorer clinical condition. This might be because this latter group may already have become accustomed to the consequences of ageing and able to apply coping strategies for health problems, whereas frail older adults still have to adapt to and accept the consequences of ageing.[33,34] Professionals should therefore consider the duration of the problems experienced in supporting older adults. Those with relatively 'new' problems may have more difficulty with coping, whereas those with persistent problems may already have adapted to some extent to their situation.

The improvements after twelve months are encouraging, since normal ageing is associated with decreased physical, cognitive and social functioning.[30,35,36] The participants may have learned about the consequences of ageing and care and support available, as communicated by case managers and as acquired during Embrace community meetings.[16] This may have strengthened their self-management abilities and coping strategies, and thus their well-being.[37,38] Care and support for older adults should therefore stimulate self-management and coping behaviour, for example by arranging adjustments at home and the acquisition of aids.

Strengths and limitations

The main strength of this study was the use of the GeriatrICS, a broad scoped ICF Core Set including the most relevant health-related problems of community-living older adults. ICF Core Sets can be a useful tool for problem assessment, goal-setting and evaluation in rehabilitation management.[39] A minority of the recently developed Core Sets has been used for evaluation of change.[40-44] The GeriatrICS proved to be sensitive for detecting changes over time and provided insight into the differences between frail participants and participants with complex care needs.

However, the results should be interpreted while taking some of the limitations of this study into account. First, causal inferences based on the results are limited as this was a pretest-posttest study with no control group.[45] Also, we included quite a number of variables in the analyses, making chance findings because of multiple comparisons more likely.[46]

Implications

The GeriatrICS can be used to identify health-related problems in older adults and to provide person-centred and integrated care and support. We further found that mobility problems were frequent and hard to counteract. The prevention of mobility problems

remains challenging.[32] In addition, the improvements after twelve months may indicate that the self-management abilities and coping strategies of older adults were strengthened. Coping is therefore an additional issue on which case managers and care givers should focus. Proactive coping in particular (being future-oriented) may be a good way to deal with the consequences of ageing.[47,48]

We found improvements in the health of older adults after twelve months of person-centred and integrated care and support; however, we used a single group pretest-posttest design. Future studies should therefore preferably include a control group as well. Furthermore, our findings should be replicated while including robust older adults as the focus in this study was on those at risk of experiencing health-related problems, i.e. frail older adults and older adults with complex care needs. In addition, research suggests that women have more problems with mobility and with performing daily activities than men. Future studies should therefore also consider possible gender differences.[49,50]

Conclusion

The GeriatrICS enables professionals to inventory self-reported health-related problems in older adults, which proved feasible and sensitive to change. Health-related problems are relevant and recognizable and could be grouped into six clusters: 'Mental Functions', 'Physical Health', 'Mobility', 'Personal Care', 'Nutrition' and 'Support'. The prevalence and severity of these problems improved in all clusters after receiving person-centred and integrated care for twelve months, except for Mobility, which showed a more varying pattern. The improvements are encouraging and may indicate a route to counteracting the decline in physical, cognitive and social functioning associated with ageing.

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